12. LANDSCAPE MAPPING

Participatory mapping, Udukumbura, Sri Lanka.
Photo: D. Mijatović
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Participatory landscape mapping is a way of obtaining and documenting spatial information on land use, agrobiodiversity and landscape features. Participatory mapping taps into local knowledge, and provides a greater understanding of human–environment interactions, activities and processes in a landscape. It can be used to gather information on spatial distribution of landscape features such as forest, cropland, grassland and wetland; human activities such as farming, grazing, fishing and collecting wild plants; and importance of specific areas for ecosystem services. Participatory maps are also useful in identifying and locating the main challenges and hazards encountered at community level, such as soil erosion, desertification, pollution, deforestation, fire and hydrogeological risks (e.g. flooding, landslides, avalanches).

When information is updated over time, maps can show changes in land-use patterns and diversity. These can be analysed using the tools provided by most georeferencing software. For example, this can show how much forest cover has been lost due to deforestation and logging activities, or a change in land use from grazing to crop production.

The participatory process is, in itself, of central importance. Knowledge is shared within the community and can be used for developing land-management plans. Access to spatial knowledge can help clarify and support community demands on their landscape and become a negotiating tool for decision-making processes on landscape management and on development projects.

Common uses of participatory maps include:
- Gathering information about land and resource-use patterns, hazards and community values in relation to agrobiodiversity conservation
- Creating management plans, such as community-protected areas and buffer zones
- Sharing knowledge within and among local communities
- Promoting community engagement in decision-making processes concerning natural resource management
- Monitoring changes in land cover and practices over time
- Documenting the impacts of logging, mining and ‘land grabs’.

12.1 CONDUCTING PARTICIPATORY LANDSCAPE MAPPING

Participatory landscape mapping is best carried out in a focus group discussion or workshop. Before the workshop, all community members should be informed about what the exercise is intended to achieve and how the community will benefit, and all community members should be invited to participate. Some of the participants will have extensive knowledge about different land uses and activities in the landscape (e.g. forestry, use of wild plants, sources of water, sacred sites) and can act as expert informants.

Mapping is usually best conducted with 10-20 participants. It can be carried out with a mixed group of men and women, or separately with men and women if that is more culturally appropriate. Information collected in separate groups sometimes provides a better understanding of the differences in land use and landscape perceptions between women and men. It is important that both older and younger members of the community participate in order to capture different perceptions of landscape features and allow for exchange of information between them. Depending on the research context and purpose, it may be desirable to include participants with expertise in different areas (e.g. animal herders, traditional healers, artisans, farmers, fishers).
PREPARATION

1. Identify participants and venue for the workshop in discussions with members of the community. Keep in mind that the activity may well take a whole day and people will probably have to come and go to deal with other commitments. Make sure the activities are dynamic and that participants are provided with adequate refreshments.

2. Arrange for one or more facilitators (one for each working group). These will need to conduct transect walks and interviews with key informants before the workshop to get to know the local classification of land and land-use patterns.

3. Prepare and print maps and collect other materials such as large pieces of transparent plastic (blank transparent overlays), paper, coded cards (for the activity on ecosystem services) and pads of sticky notes. Printed maps can be prepared using a satellite base map. Participants can then draw landscape features on transparent overlays on the map.

   - Prepare and print the satellite map in advance. The map should be $1m \times 1m$ or larger. Use Landsat or Google Earth images at a scale of $1:15,000$–$1:30,000$, adjusting the scale depending on the area that the community manages. In the case of nomadic communities, the scale may need to be smaller than $1:30,000$. When preparing the map in Landsat or Google Earth, add dots with coordinates along the edges of the map (see Figure 12.1a). Mark these also on the transparencies to permit georeferencing and digitizing the maps.

   - Prepare blank transparent overlays in advance. During mapping, make sure that every transparent overlay is firmly attached to the map to prevent movement between the two and ensure the accuracy. This can be done by lining up the dots with coordinates on map and transparent overlays (see Figure 12.1a).

THE MAPPING PROCESS

Mapping can be conducted in different ways; here we provide an example of activities for participatory mapping.

After the introduction and preliminary discussion, invite the participants to add the following items to the map:

- **Land features and land cover**, such as rivers, roads, lakes, forests and villages. This will help everyone to recognize and locate themselves on the map. The participants can start by marking their own homes and then marking natural and managed land cover/use types by drawing different areas (technically called polygons) for forest, crop production, grazing and fishing.

- **Human activities**, such as fishing, cropping, grazing, and collecting wild food, medicinal plants, fodder, timber, and building. Use different symbols for the different activities.

- **Challenges and hazards**, such as threatened habitats or species, areas of soil erosion, soil and water pollution, deforestation, desertification, drought, plant diseases, flood risk or fire risk. These can be identified through discussions that start with questions such as:
  - Are there places where the water is polluted?
  - Are floods and mudslides happening in any particular place?

- **The importance of different land uses for ecosystem services**, such as water regulation, soil quality, pollination and pest control. Ask participants to locate on the map the areas that provide different ecosystem services.

One way of doing this is by giving participants coded cards for different ecosystem services, which they can place on the parts of the landscape that are the most important for each ecosystem service. Since ecosystem services are fairly abstract terms, it is best to ask specific questions like those listed in Table 12.1.

<table>
<thead>
<tr>
<th>Type of ecosystem service</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provisioning</td>
<td>Where do you go to get water to drink or for use in cooking? From where do you get water for agriculture?</td>
</tr>
<tr>
<td>Cultural</td>
<td>Which areas are important for cultural reasons?</td>
</tr>
<tr>
<td>Regulating</td>
<td>Which areas are important to minimize flooding? Which areas are important to minimize the impact of droughts? Which areas are important to reduce soil erosion? Which areas are important to maintain soil fertility? Which areas are important for pollination? Which areas are important for pest control?</td>
</tr>
<tr>
<td>Supporting</td>
<td>Which areas are important for wildlife, for example, for mating season, forage, spawning, migration?</td>
</tr>
</tbody>
</table>
Another way to conduct this activity is by using signs for land cover/use types and coded cards for ecosystem services (see photo below right).

- Make signs for each land cover/use on sheets of paper. For example, the forest sign might consist of a sheet of paper with ‘forest’ written in local language. Place the signs on a table or on the ground. The signs represent land uses in the landscape.
- Prepare coded cards with a unique number and questions in English and local language. A unique number is assigned to each participant beforehand. For example, the participant with number 1 will get ten cards marked with the number 1, one card with each of the ten questions in Table 12.1). The farmer with number 2 will get ten cards with the number 2 on them, and so on.

Ask each question, one at a time, and let the participants place their cards on the land-cover/use sign that best corresponds to the question. For example, ask the first question, “Where do you go to get water for human consumption?” After all participants have placed their cards on the sign, move on to the next question.

Geographical data from the maps can be digitized. The first step is to georeference the base map and transparent overlays. For this, the transparent overlays laid over the base map have to be photographed. Make sure the transparent overlays are well labelled, that the coordinates on the base map and transparencies match (Figure 12.1a) and that the transparent overlays are not wrinkled. Put the base map and the transparent overlays on a flat surface. Using a good camera that takes high-resolution images, take a photograph from above the centre of the map and perpendicular to the map (Figure 12.1b).

Georeferencing is the process of assigning coordinates to the participatory maps. The different steps involved in georeferencing are beyond these guidelines and, wherever possible, geographic information system (GIS) experts should be asked to support or do georeferencing.

Georeferencing tools are specific software that allows the creation and analysis of spatial data, based on information carrying geographical coordinates. Commercial GIS software includes ArcGIS and ArcMap. QGIS (Quantum GIS http://www.qgis.org/en/site/) is a user-friendly open-source tool for mapping and digitizing geographical information. The program allows the user to draw points, lines and polygons (also called ‘shapefiles’) over satellite or topographical bases (also called ‘rasters’).

**Figure 12.1** Taking photos of the transparencies

a. Transparencies matching the coordinate marks

b. Taking picture from centre of the map perpendicularly

**Figure 12.2** Map of the Abolhassani Indigenous Nomadic Tribal Confederacy, Iran.
Source: G. Azhdari, CENESTA